UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/808,245	03/24/2004	Tacyoung Han	DP-310179	4199

7590 03/06/2006

SCOTT A. McBAIN
DELPHI TECHNOLOGIES, INC.
Legal Staff, Mail Code: 480-410-202
P.O. Box 5052
Troy, MI 48007-5052

EXAMINER	
BAREFORD, KATHERINE A	

ART UNIT	PAPER NUMBER
1762	

DATE MAILED: 03/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/808,245	HAN ET AL.	
	Examiner	Art Unit	
	Katherine A. Bareford	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) *11-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-10, drawn to a method, classified in class 427, subclass 446.

II. Claims 11-20, drawn to an apparatus, classified in class 239, subclass 79.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus as claimed can be used to practice another and materially different process, such as one where the particles are melted during the spraying.

3. Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Mr. S. McBain on Dec. 14,2 005 a provisional election was made with traverse to prosecute the invention of Group I,

claims 1-10. Affirmation of this election must be made by applicant in replying to this Office action. Claims 11-20 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Double Patenting

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. Claims 1-3, 5-6 and 8-10 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2, 6, 7 and 9-11 of copending Application No. 10/924,270. Although the conflicting claims are not identical, they are not patentably distinct from each other because 10/924,270 provides all the features required by the claims of the present application and more. For example, in claim 1 of 10/924,270 all of the same features as claim 1 of the present application are required and a further requirement as to the structure of the supersonic converging/diverging nozzle is made, and this structure is not prevented by the present claims. As to the injecting the particles parallel to a longitudinal axis of the gas/powder exchange chamber (claim 6 of the present application), it is the Examiner's position that this is well known in the art of kinetic spraying to be the conventional direction of injection.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-6 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van Steenkiste et al (US 6283386) in view of Kay et al (US 2001/0042508).

Van Steenkiste teaches a method of kinetic spray coating a substrate. Column 1, lines 10-15. Particles of a powder are provided. Figure 2 and column 3, lines 30-65. Van Steenkiste notes that kinetic spray coating is also known as cold gas dynamic spray coating. Column 1, lines 15-25. The particles are injected into a gas/powder exchange chamber (the mixing chamber 42) and entrained into a flow of main gas in this chamber. Figure 2 and column 3, lines 30-65. The main gas is at a temperature insufficient to heat the particles to a temperature above a melting temperature of the particles. Column 3, lines 30-65 and column 2, lines 1-5. The particles entrained in the main gas in the

gas/powder exchange chamber can be considered to be directed into a gas/powder conditioning chamber, as the "mixing chamber 42" can be described as both chambers as no structural difference or wall between the exchange chamber and conditioning chamber is required as claimed. Figure 2 and column 3, lines 30-65. The particles entrained in the flow of gas from the "conditioning" chamber are directed into a converging diverging supersonic nozzle, thereby accelerating the particles to a velocity sufficient to result in adherence of the particles on a substrate positioned opposite the nozzle. Figures 1-2 and column 3, lines 55-65.

Claim 2: the particles can be a metal, alloy, polymers, ceramic or semiconductor. Column 1, lines 55-60 and column 4, lines 25-30.

Claim 3: the particle diameter can be 1-106 microns. Column 4, lines 10-30 and column 5, lines 25-55.

Claim 5: the main gas temperature can be 900 degrees F (approximately 482 degrees C) , for example. Column 4, lines 45-50.

Claim 6: the particles are injected parallel to a longitudinal axis of the gas/powder exchange chamber (mixing chamber). Figure 2.

Claim 9: the particles can be accelerated to about 1000 m/sec. Column 1, lines 65-68.

Claim 10: the substrate can be a metal alloy. Column 4, lines 35-40.

Van Steenkiste teaches all the features of these claims except (1) the length of the conditioning chamber (claims 1,8) and (2) injection pressure (claim 4). Van Steenkiste

does teach that it was believed that a threshold velocity should be reached in order for the particles to desirably adhere to the substrate, and that the velocity achievable is related to the air temperature. Column 4, line 60 through column 5, line 15. Van Steenkiste further reasoned that reducing the flow of unheated powder feeder air relative to the heated main air flow that accelerates the particles provides that the resulting temperature of the mixed air flow through the nozzle is then greater and provides higher air velocities to accelerate larger particles to the threshold velocity, resulting in better adhesion. Column 5, lines 1-20. As to the injection pressure, Van Steenkiste teaches that the air is fed using a high pressure powder feeder from an original air compressor capable of supplying air pressure up to 500 psi. column 3, lines 30-40.

Kay teaches an apparatus and method of kinetic spray (cold gas dynamic spraying) coating a substrate. Paragraph [0001]. Particles of a powder, which can be a metal, alloy or polymer, are provided. Figures 1-2 and paragraphs [0001] and [0016]. The particles are injected into a gas/powder exchange chamber (the mixing chamber 15) and entrained into a flow of main gas in this chamber. Figure 2 and paragraph [0016]. The main gas is at a temperature insufficient to heat the particles to a temperature above a melting temperature of the particles. Paragraphs [0001] and [0016]. The particles entrained in the main gas in the gas/powder exchange chamber can be considered to be directed into a gas/powder conditioning chamber, as the "mixing chamber 15" can be described as both chambers as no structural difference or wall

between the exchange chamber and conditioning chamber is required as claimed. Figure 2 and paragraph [0016]. The particles entrained in the flow of gas from the "conditioning" chamber are directed into a converging diverging supersonic nozzle, thereby accelerating the particles to a velocity sufficient to result in adherence of the particles on a substrate positioned opposite the nozzle. Figure 2 and paragraphs [0001] and [0016]. Kay teaches to control the length of extending portion 13 of the gas entrained powder through powder feed tube 7 into the mixing chamber 15 to fine tune performance characteristics of the system. Paragraphs [0016] and [0020]. Changing the point of entry of the powder from the tube would change the length of the "conditioning chamber" as the powder would travel a different length after being "entrained". Kay also teaches that a high pressure gas stream is used to feed the gas into the system. Paragraph [0015] and figure 1.

It would have been obvious to one of ordinary skill in the art the time the invention was made to modify Van Steenkiste to perform routine experimentation to optimize the length of the mixing chamber (and thus, also the "conditioning chamber") as suggested by Kay in order to optimize the performance characteristics of the system, because Van Steenkiste provides that the air temperature is directly related to the air velocity reachable in the supersonic nozzle, and achieving higher air temperatures allows for achieving higher velocity in the nozzle and greater adhesion of particles, and Kay further indicates that controlling the entry point of the powder nozzle (changing the length of powder passage through the "mixing chamber") should be optimized to

fine tune performance characteristics of the system. The longer the powder passes through the mixing chamber/conditioning chamber, the longer for the mixture of air (the unheated powder feed air and the heated main air) to become heated (as the unheated powder feed air is heated by the heated main air) to an equilibrium temperature and allow for maximum velocity, thus providing that the mixing chamber/conditioning chamber should be as long as possible to provide the optimum air temperature. While applicant provides benefits of using a conditioning chamber as claimed, these benefits would be suggested by the desire provided by the references to provide a long mixing chamber. It would further have been obvious to modify Van Steenkiste in view of Kay to perform routine experimentation to optimize the amount of pressure that the injected particles are provided at above the pressure of the main gas because Van Steenkiste and Kay both teach to provide the injected particles using a high pressure feeder and it would be clear to one of ordinary skill in the art that the pressure of the feeder should be above the pressure of the main gas to prevent backflow into the feed tube but low enough to provide for optimum entraining, so one of ordinary skill in the art would optimize the pressure amount so as to prevent this backflow and still allow for desirable entraining of particles and main gas.

11. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Van Steenkiste in view of Kay as applied to claims 1-6 and 8-10 above, and further in view of Schwarz et al (US 5273957).

Van Steenkiste in view of Kay teach all the features of these claims except the angled entry of the particles.

However, Schwarz teaches that when spraying particles through a nozzle system onto a substrate, it is well known to also provide the particles at an angled entry prior to the spray nozzle. See figures 1-2 and column 4, lines 30-55.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Van Steenkiste in view of Kay to provide for angled entry of the particles as well as longitudinal entry as suggested by Schwarz with an expectation of providing a desired flow of particles, because Van Steenkiste in view of Kay wish to entrain particles into a flow of gas and Schwarz teaches that particles can also be entrained into a flow with an angled entry. While Schwarz goes on to melt the particles, the initial entraining remains the same whether the particles are melted or not.

12. Han et al (US 2006/0040048) is the publication of 10/924,270.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone numbers

for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KATHERINE BAREFORD
PRIMARY EXAMINER